

Memorandum on Rabies

Prevention and Control

February 2000

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Foreword

This Memorandum replaces the edition issued in August 1977. It has been prepared in the light of the recommendations of the World Health Organisation (WHO) Expert Committee on Rabies 1992, and the Report by the Advisory Group on Quarantine 1998, chaired by Professor Ian Kennedy.

The Kennedy Group's analysis concluded that there would be no significant increase in the already very small risk of importing rabies into Great Britain should quarantine be replaced by a new vaccine-based system for cats, dogs and certain other species travelling to and from certain rabies-free islands and countries. In place of quarantine, the Group proposed a system ensuring the animal is identifiable, vaccinated against rabies, blood tested to confirm immunity, treated against particular parasites, and certified as such.

Following consultation, the Government announced that the Pet Travel Scheme (PETS) would be introduced no later than April 2001 and that a pilot would start before April 2000. The pilot starts on 28 February 2000 and is designed to test the practical arrangements before the main scheme is implemented. The pilot is restricted to pet cats and dogs from Western European countries and assistance dogs from Australasia. The publication of an up-to-date Memorandum on Rabies is therefore timely.

The Memorandum has been prepared by the Department of Health in conjunction with the Ministry of Agriculture, Fisheries and Food, the Public Health Laboratory Service, the Health and Safety Executive, and others. The Advisory Committee on Dangerous Pathogens has been consulted and has endorsed the contents.

This Memorandum is intended primarily for use by the local public health services, especially Consultants in Communicable Disease Control and, in Scotland, Consultants in Public Health Medicine for Communicable Disease and Environmental Health. They will wish to follow the action described in Chapter 4 in particular.

The document is also being made available to others in the medical and allied professions, and to anyone with an interest. It is being published on the Department of Health's website at www.doh.gov.uk/memorandumonrabies/

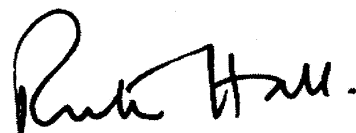
The Chief Medical Officers would welcome feedback which would help improve the content, format and usefulness of this document. Comments should be sent to Hannah Lewis, Room 531B, Skipton House, 80 London Road, London SE1 6LW. e-mail: Hannah.Lewis@doh.gsi.gov.uk



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Chapter 1

Background

- 1.1 Rabies is an acute viral infection of the central nervous system. Although post-exposure treatment is available, once symptoms develop the condition is invariably fatal. In endemic areas, the infection is maintained in animal populations and transmitted to people primarily via the bite of an infected animal or, rarely, through contamination of broken skin or mucous membranes.

Rabies in animals

Susceptibility and epidemiology

- 1.2 Rabies has been recorded in most warm-blooded animals, domesticated and wild. Infection is usually transmitted by an affected carnivore. While all mammals are believed to be susceptible to rabies, the continued existence of the disease depends on a 'lead' vector. Susceptibility of other species and humans is influenced by a variety of factors including the quantity and strain of the virus introduced, the transmission route, and the species of the recipient host.

Rabies in Great Britain

- 1.3 Great Britain has been free of rabies for most of this century; the last case of indigenous animal rabies occurred in 1922. The last recorded cases of rabies outside quarantine were in 1969 and 1970 when two imported dogs died soon after completing 6 months quarantine. Since 1970, two dogs have died in quarantine with evidence of rabies in the brain. Neither originated in Western Europe. The most recent case of rabies in Great Britain was a Daubenton's bat infected with European Bat Lyssavirus 2, found in Newhaven, Sussex, in May 1996. The country of origin of the bat is not known. No confirmed cases have previously been found in bats in Great Britain.
- 1.4 Because of the existence of the disease in Continental Europe and elsewhere there has been concern at the risk of rabies being reintroduced into Great Britain. The main threat of introduction of rabies is still from illegal importation of an infected carnivore (most likely a dog, cat or fox), arriving by commercial or private transport from any part of the world where rabies occurs. According to existing knowledge and experience, non-carnivores pose a very low risk. The risk of further infected bats in Great Britain is thought to be low.

- 1.5 During 1998, 64 dogs and 35 cats are known to have been illegally landed in Great Britain. In addition there were 16 reported incidents of illegal landings of other rabies-susceptible animals.
- 1.6 If the virus were to be introduced into wildlife in Great Britain, then the fox would be the most likely vector species. However, the greatest risk to humans would be from contact with infected dogs and cats. Most other small wild animals and farm animals can also be readily infected, but non-predatory animals such as cattle, sheep, pigs and horses rarely transmit the disease to animals of other species, including humans.

Rabies in Europe

- 1.7 During the last century rabies has spread throughout parts of Central and Western Europe. Foxes have been the main host, but other mammals have also been infected, including not only dogs and cats, but also cattle, horses, badgers, martens, deer, sheep, goats and racoon dogs. However, during the last 10 years, the incidence of endemic, fox-adapted rabies in Western Europe has fallen dramatically, and it appears to have been virtually eliminated from the EU. This has been largely due to the success of co-ordinated wildlife vaccination programmes, together with the availability of effective commercial vaccination for domestic animals. Some EU member states have continued to report occasional cases of rabies in domestic animals imported from non rabies-free countries. In Eastern Europe rabies remains prevalent, and in Turkey the threat of dog-adapted rabies is serious.
- 1.8 The classical rabies virus is not present in reservoir species of bats in Europe, although it does occur in bats elsewhere in the world. However, disease caused by rabies-related viruses, European Bat Lyssaviruses (EBL), has been reported in insectivorous bats from several European countries. Bats suffering from these viruses show signs of disorientation, unco-ordination and occasionally aggression.
- 1.9 These rabies-related bat viruses do not appear to readily infect terrestrial mammals. There are no known recorded cases of natural transmission to other animal species, despite a relatively widespread prevalence in bats. However, there have been very rare fatal human infections in individuals working closely with bats following biting incidents. Three human deaths have occurred in Europe in the past 30 years associated with EBL. Limited cross-protection has been shown experimentally between classical rabies vaccines and EBL, and so it is recommended, as a precaution, that pre-exposure vaccination is given to people likely to be at risk of exposure through the close handling of bats.

Rabies in the rest of the world

- 1.10 Rabies is endemic in all continents except Antarctica and Australasia, although individual countries (often peninsulas or islands) are reported to be rabies free. In the United States of America, skunks, racoons and bats account for 85% of cases of animal rabies. In Asia, Africa, Central and South America, rabies is endemic in feral dogs. In Mexico and Central and South America, vampire bats carry the classical rabies virus.
- 1.11 Although Australia remains officially rabies free, a virus that is serologically very closely related to the rabies virus has recently been recovered from several species of bat on that continent. It has been responsible for at least two human deaths.

Recent developments

- 1.12 In 1994, the Channel Tunnel provided a new link between Great Britain and the rest of Europe. The Ministry of Agriculture, Fisheries and Food was involved in negotiations on the building of the tunnel, and anti-rabies measures were incorporated in its construction to prevent the possible illicit entry of rabies-susceptible animals. The opening of the Channel Tunnel has, therefore, not significantly increased the risk of rabies being spread to Great Britain.
- 1.13 In the light of recent scientific advances, the issue of whether quarantine is still required has been reviewed. In September 1998, the Advisory Group on Quarantine, chaired by Professor Ian Kennedy, published its report⁽¹⁾. It concluded that there would be no significant increase in the already very small risk of importing rabies into Great Britain should quarantine be replaced by a new vaccine-based system for cats, dogs and certain other species travelling to and from certain rabies-free islands and countries. In place of quarantine, the Group proposed a system ensuring the animal is identifiable, vaccinated against rabies, blood tested to confirm immunity, treated against particular parasites, and certified as such.
- 1.14 These recommendations have provided the basis for the Pet Travel Scheme (PETS), starting with a pilot from 28 February 2000. Pet cats and dogs qualify for exemption from quarantine under the pilot scheme if certification confirms that they are: microchipped; vaccinated against rabies; blood tested; treated against ticks and the fox tapeworm; and have not been outside the qualifying countries in the six months before entry to Great Britain. Details of Government Policy, Legislation and PETS can be found in **Appendix 1**.

Clinical Signs of rabies in animals

- 1.15 Incubation periods in animals vary greatly, due to the interaction of virus and host factors together with the size and location of the bite. The incubation period in dogs is usually between three and eight weeks. Once the virus reaches the central nervous system the main clinical symptoms can appear. These may vary depending on the region of the brain that is affected. They can last from less than a day to over a week. There are three main stages:
- a) Prodromal stage - the animal becomes irritable, anxious, uneasy, sensitive to noise and light, and may display loss of appetite and bite the original wound site.
 - b) Excitement stage (“furious” rabies) - irritability gives way to overt aggressiveness and fits. The animal attempts to bite objects and other animals; may want to break loose from any restraint; the eyes take on a staring expression; there may be copious salivation; the lower jaw tends to sag; and there may be a change in voice. Animals do not show signs of hydrophobia.
 - c) Paralytic stage (“dumb” rabies) - a progressive paralysis of limbs and body sets in, causing staggering and respiratory distress; this is quickly followed by coma and death.
- 1.16 In the earlier stages a common factor is that the animal undergoes a change of temperament. A normal, friendly animal may become snappy and seek to avoid its owner’s company; whereas timid animals may become less restrained and unnaturally approachable. This is the common feature of wild animals, making them a particular hazard to children who, while delighting in their apparent ‘friendliness’ become exposed to infection.
- 1.17 The stages may be of variable duration, so that earlier signs may not be apparent and an animal may only show the terminal stages of the disease. Cats are more likely to develop “furious” rabies than dogs or foxes. The overall period from onset of clinical signs to death rarely exceeds 15 days.

Transmission

- 1.18 The saliva of animals may be infectious for three to five days (exceptionally up to two weeks, or up to 29 days in foxes) before frank clinical signs appear. Saliva remains infectious until the animal dies, but viral excretion in the saliva may be intermittent.

Rabies in people

Epidemiology

- 1.19 The WHO World Survey of Rabies for the year 1997 reported that, worldwide, the number of human rabies deaths is estimated to be between 35,000 and 50,000 annually⁽²⁾. The highest numbers are reported from Asia, and particularly from India.
- 1.20 Fatal cases of human rabies are relatively rare in countries with ready access to post-exposure immunisation and wound treatment. The 1997 WHO Survey indicated that in Europe alone some 50,742 individuals were given rabies prophylaxis in 1997 following exposure to domestic or wild animals⁽²⁾. Thirteen human deaths from rabies were recorded during the same period, with 10 of these occurring in the Russian Federation.

Rabies in people in Great Britain

- 1.21 The last human death from indigenous rabies in Great Britain was in 1902. Deaths continue to occur from time to time in people infected abroad. Such instances are, however, rare; 20 such deaths have been reported since 1946. None had received post-exposure prophylactic treatment. The last of these was in October 1996. A 19 year old man died in a London hospital having returned three weeks previously from Nigeria where he had been bitten on the ankle by a stray dog.
- 1.22 A considerable number of people present for medical advice on their return to Great Britain with a history of exposure to an animal abroad. In 1997, 472 such individuals referred to the Central Public Health Laboratory received post-exposure vaccine, with or without specific immunoglobulin, mainly following dog bites in rabies-endemic countries.

Transmission

- 1.23 People are exposed to rabies when they come into physical contact with the rabies virus. However, not all exposures to rabid animals lead to infection and, according to Hattwick & Gregg⁽³⁾, not all those infected develop the disease.
- 1.24 Dog and cat bites are the main source of infection in humans. Although an animal bite with virus-containing saliva is the usual mode of infection in people, transmission of the virus can also occur through mucous membranes, though not through intact skin.

- 1.25 Airborne transmission of infection is thought to have occurred in two men who inhaled virus aerosols generated in caves inhabited by rabid bats, and in a laboratory worker who became infected while rabid sheep brains were being ground for vaccine production⁽⁴⁾.
- 1.26 Accidental transmission of rabies by tissue transplant has been reported in France, Iran, the USA and Thailand, but has not occurred in Great Britain. Seven patients are known to have received corneal transplants from patients who died of unsuspected paralytic rabies. Six of the seven patients developed rabies with an incubation period between 22 and 39 days⁽⁵⁾. The seventh patient had her corneal transplant just before the donor's diagnosis was made; she received post-exposure rabies immunoglobulin and vaccination, and remained well.

Clinical characteristics

- 1.27 The incubation period of the disease in people is generally two to eight weeks, but may range between nine days and two years or more. The period tends to be shorter for bites to the face and neck than for bites to the legs.
- 1.28 The onset of illness is insidious. A history of animal bite or other exposure is important, but is not always obtained. Early symptoms may include paraesthesia around the bitten area. Fever, headache, nausea and a sense of apprehension have also been described. The disease may then present with spasms in response to tactile, auditory, visual or olfactory stimuli, or with hydrophobia, intermittent episodes of excitement, hallucinations and maniacal behaviour, progressing to paralysis and coma, or as an ascending flaccid paralysis with sphincter involvement and sensory disturbances. Death resulting from respiratory and bulbar paralysis is almost inevitable once clinical symptoms have appeared.
- 1.29 The disease has to be differentiated from tetanus, hysteria, bulbar poliomyelitis, Guillain-Barré syndrome and other causes of ascending paralysis. Since imported cases have been noted in rabies-free countries, WHO recommends that it is included in the differential diagnosis of all those who present with neurological signs.

Chapter 2

Prevention of rabies in people

This chapter is based on the UK Health Departments 'Immunisation against Infectious Disease' ("the green book")⁽⁶⁾.

Pre-exposure (prophylactic) immunisation

2.1 Pre-exposure immunisation with human diploid cell rabies vaccine (HDCV) should be offered to the following groups of people:

People who should be offered pre-exposure immunisation

- Laboratory workers handling the virus.
- Those who in the course of their work may be at risk of exposure to infection due to the regular handling of imported animals that either may not have completed quarantine or may not have fulfilled the requirements of the Pet Travel Scheme, e.g.
 - at animal quarantine centres;
 - at zoos;
 - at research and acclimatisation centres where primates and other imported animals are housed;
 - at ports, e.g. certain Customs and Excise Officers;
 - carrying agents authorised to carry imported animals.
- Veterinary and technical staff in the State Veterinary Services.
- Inspectors appointed by local authorities under the Animal Health Act 1981. (This only includes those local authority dog wardens who are also inspectors. Other dog wardens should have a low risk of exposure, and post-exposure prophylaxis in the event of an incident is likely to be more appropriate).

- Licensed bat handlers.
- Workers in enzootic areas abroad, who by the nature of their work are at special risk of contact with rabid animals (e.g. veterinary staff or zoologists).
- Health workers who are likely to come into close contact with a patient with rabies (see Chapter 3).

2.2 The vaccine currently in use (HDCV) is a freeze-dried suspension of Wistar rabies virus strain PM/WI 38 1503-3M cultured in human diploid cells and inactivated by beta-propiolactone. The potency of the reconstituted vaccine is not less than 2.5 International Units per 1 ml dose. Details on vaccine use for pre-exposure prophylaxis can be found in **Appendix 2**.

Adverse reactions

2.3 HDCV may cause local reactions such as redness, swelling or pain at the site of injection within 48 hours of administration. Systemic reactions such as headache, fever, muscle aches, vomiting, and urticarial rashes have been reported. Anaphylactic shock has been reported from the USA and Guillain-Barré syndrome from Norway. Reactions may become more severe with repeated doses. The vaccine contains traces of neomycin. Suspected adverse reactions should be reported to the Committee on Safety of Medicines using the yellow card system.

Contraindications

2.4 There are no absolute contraindications to HDCV, but if there is evidence of hypersensitivity subsequent doses should not be given except for necessary post-exposure treatment.

2.5 Pre-exposure vaccine should only be given to pregnant women if the risk of exposure to rabies is high.

Advice to Travellers Going Abroad

- 2.6 Pre-exposure immunisation should be considered for travellers to enzootic areas who may be exposed to unusual risk of being infected through:
- (i) work involving handling animals;
 - (ii) longer term or rural travel, especially if more than a day away from modern medical treatment.

More detailed country by country advice is contained in the UK Health Departments' book 'Health Information for Overseas Travel'⁽⁷⁾.

- 2.7 Information for the public can be found in the Department of Health's leaflet 'Health Advice for Travellers'. Directors of Public Health should ensure that local travel health literature covers the prevention of rabies. Travellers going to areas where rabies exists should avoid unnecessary contact with animals. Those who have taken pre-exposure vaccine must still seek post-exposure medical advice and vaccination. The antibody response to the post-exposure prophylaxis in these cases can be expected to be more rapid.
- 2.8 Telephone advice (for health professionals) on pre-exposure rabies vaccination can be obtained from the Travel Unit, Communicable Disease Surveillance Centre (CDSC) (020 8200 6868), or local Consultants in Communicable Disease Control (CsCDC). In Scotland, the Scottish Centre for Infection and Environmental Health (SCIEH) (0141 300 1100), or Consultants in Public Health Medicine for Communicable Disease and Environmental Health (CPHM CD/EH) can be contacted.

- 2.9 If travellers are bitten or scratched by an animal in a rabies enzootic country (see **Appendix 3**), immediate attention to the wound is essential and the actions in the table below should be taken.

Action if bitten or scratched by an animal in a rabies enzootic country: information for patients and those providing initial medical care

Immediate first aid

- Wash the wound at once under a running tap for 5 minutes with soap or a detergent. Primary suture and scrubbing should be avoided if possible.
- Apply 40-70% alcohol, tincture or aqueous solutions of iodine or quaternary ammonium compounds which have a proven lethal effect on rabies virus, e.g. Cetrimide solution 0.1% BPC; and cover with a simple dressing.
- Do not apply unfamiliar substances to wounds as that could impair the body's immune response.
- Antibiotics and specific tetanus prophylaxis should be given if necessary.
- Post-exposure immunisation may be required (see below).

Medical assistance

- If post-exposure treatment is advised it should be started immediately (schedules can be found in **Appendix 3**); if the animal is wild or a stray and observation is impossible, the doctor will know if rabies occurs in the locality and if immunisation is advised.
- In the case of difficulty contact the nearest British Consular official.
- Report the incident to the local police, particularly if the animal is a stray.
- On return to this country, if travelling through Heathrow or Gatwick Airports, consult the Duty Port Medical Officer at the Health Control Unit before passing through customs/immigration controls; otherwise seek medical advice as soon as possible. This will normally be through your general practitioner.

Contact details

- Where possible, exchange names, addresses and telephone numbers with the owner or person in charge of the animal. Post-exposure prophylaxis should be continued unless reliable information is received that the dog or cat is well after 15 days. Ask whether the animal has been vaccinated against rabies and if possible find out when and where.

Post-exposure treatment

2.10 When exposure to rabies has occurred, human cases and deaths can usually be prevented by prompt and appropriate post-exposure treatment. This will be required even when pre-exposure immunisation has been given. Post-exposure treatment includes treatment of the wound and specific treatment with rabies vaccine, and sometimes also human rabies-specific immunoglobulin (at site of wound and by intramuscular injection). Where post-exposure treatment is indicated, this should be started at once.

Specific treatment

2.11 Specific treatment aims to achieve protective levels of local and circulating antibodies as soon as possible, to prevent the development of clinical disease. Treatment depends on the immune status of the individual, the risk of the animal being rabid and the site and severity of the bite. In general, people who are already fully immunised require two booster doses of vaccine, while those who have not been fully immunised before require five doses of vaccine. They may also need human rabies-specific immunoglobulin to give immediate (passive) protection while (active) immunity from the vaccine develops. The full schedules can be found in **Appendix 3**.

- 2.12 Detailed advice on measures to be taken and on the use of rabies vaccine and immunoglobulin may be obtained from the Virus Reference Division of the Central Public Health Laboratory (Tel: 020 8200 4400) where stocks of these agents are held for post-exposure use (see **Appendix 4**). In Scotland, advice can be obtained from the SCIEH (0141 300 1100).
- 2.13 Answers to the following questions are needed to determine the correct schedule of rabies prophylaxis for a patient who has suffered an animal bite or other potential exposure.

Ten questions to ask the patient

1. Was the person bitten, or licked on an open wound or mucous membranes by an animal?
2. Where on the body was the bite/lick ?
3. Where did the incident take place and on what date?
4. What species was the animal?
5. Is rabies known or suspected to be present:
 - (a) in the species?
 - (b) in the area?
6. Is there an owner known and contactable?
7.
 - (i) Was the animal behaving normally at the time?
 - (ii) Had it been vaccinated?
 - (iii) Is the animal being held under observation?
8. If the animal was a dog or cat did it become ill while under observation.
9. If the animal has died, does laboratory examination of the animal's brain confirm rabies?
10. Has the bitten person previously received rabies vaccine? How much does the person weigh? (relevant to HRIG dosage)

- 2.14 Where rabies is enzootic, or where an epizootic of rabies occurs, post-exposure treatment is usually begun as soon as a person reports a bite by an animal suspected of having rabies. Even where the animal appears healthy and is kept under observation, it will usually be prudent to start post-exposure treatment, and to continue it until the state of health of the animal is assured at least 15 days after the bite. (The terms enzootic and epizootic are applied to disease in the animal population in the same way that the terms endemic and epidemic are applied to disease in man).

- 2.15 When travellers returning to this country report an exposure to an animal abroad, it will usually be advisable to start treatment and then, where possible, ascertain the health of the biting animal. Treatment can be stopped if the animal is confirmed as remaining well. If necessary, the Communicable Diseases Branch of the Department of Health (Tel: 020 7972 4481 or out of hours, 020 7210 3000), may be able to assist in making enquiries of foreign health authorities regarding the health of the animal involved in an incident. Relevant particulars, such as the date of the incident, the location where the incident occurred, the species and description of the animal involved, and the name, address and telephone number of the owner of the animal, are needed to enable the animal concerned to be identified and traced.
- 2.16 The possibility of contracting rabies from an animal bite in Great Britain is extremely remote. There have been no such cases for almost 100 years. Those treating animal bites in this country should enquire about possible exposures to rabies. A definite possibility of exposure to rabies must be established before specific prophylaxis is recommended. In the absence of a history of possible exposure, or where the biting animal is untraceable, there is no indication to offer rabies prophylaxis. An important consideration would be knowledge that the biting animal was in, or had recently been released from, quarantine, or had been imported illegally.
- 2.17 Where suspicion exists, the medical practitioner should contact the local CCDC (or CPHM CD/EH in Scotland) who can obtain further information on the extent of the risk in the particular instance from the Divisional Veterinary Manager. Contact details can be obtained from the Ministry of Agriculture Fisheries and Food (MAFF). More details on public health measures can be found in Chapter 4.

Chapter 3

Management of a patient with rabies

Treatment and Care

- 3.1 If started early, the post-exposure treatment described in Chapter 2 and **Appendix 3** can be expected to prevent rabies. Once clinical symptoms and signs of rabies appear, treatment is ineffective. Although human rabies is almost invariably fatal, a few instances of recovery have been recorded. In spite of the poor prognosis, patients should be given full supportive care.
- 3.2 When treating a patient with rabies it should be borne in mind that patients remain conscious, often aware of their illness, and are usually extremely agitated, particularly when excitation is predominant. They should be sedated with an appropriate tranquilliser.

Protection of health care professionals

- 3.3 Rabies virus is a biological agent to which the Control of Substances Hazardous to Health (COSHH) Regulations 1999 apply⁽⁸⁾. It is classified as a hazard group 3 biological agent⁽⁹⁾. Detailed guidance on the application of the COSHH Regulations in respect to agents is given in the Control of Biological Agents Approved Code of Practice (ACOP) 1994 and the General COSHH ACOP 1994, schedule 3 of which is particularly relevant⁽⁸⁾. The COSHH Regulations require assessments to be done on the risks to health from work activities and prevention of exposure to risks, or adequate control measures if prevention is not possible. All health care workers should be provided with information, instruction and training about the risks of rabies exposure and the precautions to be taken if they are likely to be exposed to the rabies virus.
- 3.4 Rabies transmission from person to person has never been documented, other than by corneal graft. As secretions do contain the virus (rabies virus may be present in the patient's saliva, tears, urine, CSF and tracheal aspirates for at least two weeks after onset of symptoms), transmission is theoretically possible.

- 3.5 The number of people attending the patient should be kept to a minimum. Nursing and medical staff should be informed of the potential risks (especially during intensive care) and must be immunised. Four intradermal injections of 0.1 ml of human diploid cell vaccine, each given into a different limb on the same day (i.e. 0.4 ml in all) has been suggested in the UK Health Departments 'Immunisation against Infectious Disease' for this purpose⁽⁶⁾. Intradermal immunisation is reliable only if the whole of the 0.1 ml dose is properly given into the dermis, and should only be performed by those experienced in the technique. (The use of the intradermal route is also on the doctor's own responsibility as it is not covered by the manufacturer's product licence).
- 3.6 Nursing and medical staff should also be provided with suitable personal protective equipment, including gloves, gowns and face visors. Surgical masks do not provide the required level of protection against the rabies virus and are inappropriate in these circumstances.
- 3.7 If contamination does occur through skin or mucous membranes, the staff should receive post-exposure prophylaxis. Staff with cuts or abrasions on their hands should not be allowed contact with the patient.

Laboratory practice

- 3.8 Human specimens for diagnostic testing should be sent to the Virus Reference Division of the Central Public Health Laboratory, Colindale (Tel: 020 8200 4400). Each case should be discussed with staff in the laboratory first so that appropriate specimens are obtained and transported correctly as detailed in **Appendix 5**.
- 3.9 Animal samples should be submitted to the Veterinary Laboratory Agency, Weybridge, following consultation with the Head of Rabies (Tel: 01932 357 840, Fax: 01932 357 239).
- 3.10 Diagnostic specimens from patients suspected or confirmed to have rabies should be handled with the appropriate precautions. Specimens should be correctly labelled, packed and stored. It should be noted that specimens from animals must only be submitted according to MAFF veterinary investigation procedures.

- 3.11 All work involving the handling of rabies virus has to be carried out under licence by the UK Agriculture Departments in MAFF Containment Level 4 facilities. Diagnostic tests and clinical laboratory investigations on suspect or confirmed patients should be carried out at COSHH Containment Level 2 or 3; the level will be dependent on the strength of suspicion of rabies (see paragraphs 8 (4) d and e of Schedule 3 of General COSHH ACOP 1999)⁽⁸⁾.
- 3.12 Centrifugation should be carried out in sealed buckets. Safe disposal of specimens and decontamination of any equipment used or areas potentially contaminated should be in accordance with the General COSHH ACOP 1999⁽⁸⁾ and the guidance on clinical waste disposal in **Appendix 6**.
- 3.13 Movement of rabies virus, other than in material for diagnostic purposes only, requires prior notification to the Health and Safety Executive (HSE). Specimens for virological and antibody testing must not be sent by post as rabies is a biological agent to which the COSHH Regulations 1999⁽⁸⁾, the Carriage of Dangerous Goods (Classification, Packaging and Labelling) and the Use of Transportable Pressure Receptacles Regulations 1996 apply.
- 3.14 Pre-exposure immunisation is indicated for those who work with the virus. Details can be found in Chapter 2.

Diagnostic methods

- 3.15 Diagnosis before death is difficult and negative results do not exclude rabies infection. Current diagnostic methods for both human and animal cases are shown in the boxes over the page.

Diagnostic methods: *Ante-mortem*

- There are currently no reliable ante-mortem diagnostic methods. Diagnosis before death is often based on case history and clinical findings rather than test results as virus detection is difficult and negative results do not exclude rabies infection.
- Viral antigen may be detected by FAT (Fluorescent Antibody Testing) in corneal smears or skin biopsies. However, FAT positive specimens are more common during the final stages of the disease. Skin biopsies are usually taken from the nuchal area of the neck with hair follicles containing peripheral nerves. Corneal impressions (never scrapings) are taken from patients with encephalitis by lightly touching the central part of the cornea with a microscope slide. Corneal impressions and skin biopsies should be refrigerated immediately after collection.
- The sensitivity of FAT for ante mortem diagnosis is nevertheless limited, although the overall sensitivity of FAT is higher with skin biopsies than with corneal impressions.
- Rabies virus may be isolated from saliva, cerebrospinal and other fluids. However, the virus may be absent from biopsies, saliva or CSF (cerebrospinal fluid) during the late stages of the disease, presumably due to the presence of neutralising antibodies.
- RT-PCR (Reverse-transcriptase Polymerase Chain Reaction) is the most sensitive test and is increasingly being used by expert laboratories to detect the rabies viral genome in animal and human samples. Indeed, it has successfully demonstrated the presence of rabies viral RNA in the saliva of infected humans. Preliminary results are normally available within two days of receipt of samples. Further investigation by DNA sequencing may be used to confirm RT-PCR diagnosis and genotype the virus.
- The CSF and/or blood should be tested for rabies antibodies as their presence in an unvaccinated patient suggests a positive diagnosis.

Diagnostic methods: *Post-mortem*

- FAT on impression smears from the cerebellum, medulla and hippocampus is the most widely used test (but may give false-negative results on degraded samples) and the result should be available within 24 hours of the receipt of the specimens.
- The RTCIT (Rabies Tissue Culture Inhibition Test) is also a routine test using a highly susceptible neuroblastoma cell culture which produces results within 4 days.
- Although histological diagnosis is not routinely used, material may be reserved for archives.
- With human samples, RT-PCR would normally be applied. The MIT (Mouse Inoculation Test) may be used in addition to the RTCIT, with results after 21 days of incubation.

Disinfection

- 3.16 The rabies virus is not particularly resistant and is readily inactivated by sunlight, heat and desiccation. Objects that are soiled by infective or potentially infective secretions or excretions may be disinfected by boiling or autoclaving. Where heat cannot be used, detergents or chemical disinfectants may be used. Substances for possible use in environmental disinfection include 3% caustic soda and commercial preparations of organic phenols, iodine, trisodium phosphate and sodium hypochlorite.
- 3.17 Normal disinfection procedures can be applied for spillages of potentially infective material, e.g. disinfectants containing 10,000 ppm of available chlorine are recommended for spillages. The use of sodium dichloroisocyanurate (NaDCC) granules is also generally recommended for clinical waste spillages because solutions lose activity with time and require regular replacement⁽¹⁰⁾.
- 3.18 Spilled waste and any absorbent material used must be placed in a clinical waste container for disposal.

Clinical waste

3.19 For clinical waste procedures please see **Appendix 6**.

Post-mortem examination

3.20 Exposure to biological agents should be prevented where reasonably practicable. Therefore post-mortems should only be performed when absolutely necessary and when diagnosis cannot be made by any other means. A sequential approach is essential in making a diagnosis whereby less hazardous procedures are carried out first to avoid unnecessary risk of exposure.

3.21 When a post-mortem is necessary, reference should be made to the precautions outlined in paragraphs 3.3 – 3.7, and staff performing a post-mortem are strongly advised to be immunised before exposure. If required, a booster dose should be given at the appropriate time to ensure the staff member is fully protected.

3.22 Post-mortem examinations should only be performed in mortuaries with appropriate physical containment features, following HSAC (Health Services Advisory Committee) guidance on safe working in the post-mortem room⁽¹¹⁾. It will be necessary to have procedures in place for appropriate disinfection of the facilities used and the sterilisation of contaminated equipment.

Disposal of corpses

3.23 The risk of infection from the body of a person who has died from rabies is considered to be low. Even so, the bodies of those known or suspected to be infected with rabies should not be embalmed. Embalming carries significant risk to the operator as sharp instruments need to be used and a substantial amount of blood is drawn. Training and adherence to agreed protocols for safe procedure are essential. Where ritual washing of the body has to be undertaken, a quaternary ammonium compound, e.g. Cetrimide solution 0.1% BPC, should be used.

Chapter 4

Public health action

Responsibility

- 4.1 Consultants in Communicable Disease Control (CCDCs), and Consultants in Public Health Medicine for Communicable Disease and Environmental Health (CPHM CD/EH) in Scotland, are responsible for leading the local public health response to known or strongly suspected cases of human rabies, or animal rabies with known or suspected human contact.

Planning

- 4.2 CCDCs and local authorities should work together to prepare joint contingency plans for the control of rabies and work out details of local liaison with those concerned. This should include involvement with local veterinary services.
- 4.3 Rabies is a notifiable disease under the Public Health (Infectious Diseases) Regulations 1988. All local doctors should be aware that they must inform their CCDC immediately by telephone if one of their patients is suspected to be suffering from rabies.

Incident control team

When to form a team

- 4.4 The CCDC should form an incident control team when there is a strongly suspected or confirmed case of human rabies, or animal rabies with known or suspected human contact.

Who to include on the team

- 4.5 The incident control team should seek support from the Regional Epidemiologist and the Communicable Disease Surveillance Centre (CDSC) in England and Wales, and the Scottish Centre for Infection and Environmental Health (SCIEH) in Scotland.
- 4.6 The incident control team should include expert representatives from the local authority and veterinary and human health agencies. When

there is a strongly suspected or confirmed case of rabies in an animal in Great Britain, the State Veterinary Service should be represented on the incident control team.

Actions for the incident control team

4.7 The incident control team, with the CCDC in the lead, should implement an action plan as follows, adapted in accordance with local needs.

To provide appropriate care of the patient

- Ensure that the patient is admitted, if necessary, to an appropriate infectious disease unit.
- Ensure that the clinician responsible is familiar with the contents of **Appendix 3** of this Memorandum.

To protect human contacts of cases of rabies (human or animal)

- Assess the risk of rabies in people who have been exposed to a suspected or confirmed case of human or animal rabies.
- Co-ordinate rabies post-exposure treatment for those at risk of infection, and ensure that appropriate prophylactic immunisation is given to contacts of a suspected or confirmed case of human or animal rabies.
- Where there is a suspected or confirmed case of human rabies, offer prophylactic immunisation to the patient's intimate home contacts. Other contacts only need to be offered prophylaxis if they have been in direct contact with the patient's body fluids since the onset of symptoms.
- When there is a suspected or confirmed human case of rabies, arrange for the disinfection of soiled articles contaminated in the domestic setting by the patient before they were admitted to hospital. Boiling, autoclaving or thorough washing with soap solution or detergent will inactivate the virus. Soft furnishings that may be contaminated and which cannot be heat-treated may be washed or dry-cleaned.
- Where premises have been declared an infected place under the Rabies Control Order, arrange for disinfection of the premises to be carried out to the satisfaction of the Ministry (MAFF) Inspector by the owner of the premises or in their default, by the local authority.

To communicate with others

- Consult the Virus Reference Division of the Central Public Health Laboratory (Tel: 020 8200 4400), and SCIEH in Scotland (Tel: 0141 300 1100), to make arrangements to secure supplies of rabies vaccine and immunoglobulin.
- Liaise with appropriate local health and veterinary services.
- Inform all general medical practitioners, medical directors of all Trusts and the Accident and Emergency Departments in their district for appropriate cascade according to local plans.
- Inform the Department of Health (Tel: 020 7972 5030) so that the appropriate Chief Medical Officer or Deputy Chief Medical Officer can be immediately notified.
- Liaise with CDSC who will liaise with the Department of Health in ensuring appropriate communications in the UK and internationally.
- Co-ordinate a response to media and public enquiries.

When there is a suspected or confirmed case of animal rabies in Great Britain

- Ensure that the appropriate Divisional Veterinary Managers and the Department of Health are informed of the circumstances of the case as a matter of urgency.
- Liaise as necessary with MAFF in the event of an infected area being declared.

Veterinary action when there is a suspect case of animal rabies in this country

- 4.8 The control of an outbreak of rabies involving animal cases and human contacts requires the concerted efforts of animal and human health services working in close liaison. Further details can be found in **Appendix 7**.
- 4.9 Rabies in animals is a notifiable disease under Article 4 of the Rabies Control Order 1974. Known or suspected cases of animal rabies must be notified to an inspector or a police constable. In this context “Inspector” means a person appointed to be an inspector for the

purposes of the Animal Health Act 1981 by MAFF, Scottish Ministers or by a local authority, and, when used in relation to an inspector of MAFF or of Scottish Ministers, includes a veterinary inspector. The Divisional Veterinary Manager should inform the CCDC of any case of suspected or confirmed rabies in animals in the district, even where there has been no known human exposure.

Diagnosis of an animal suspected of having rabies

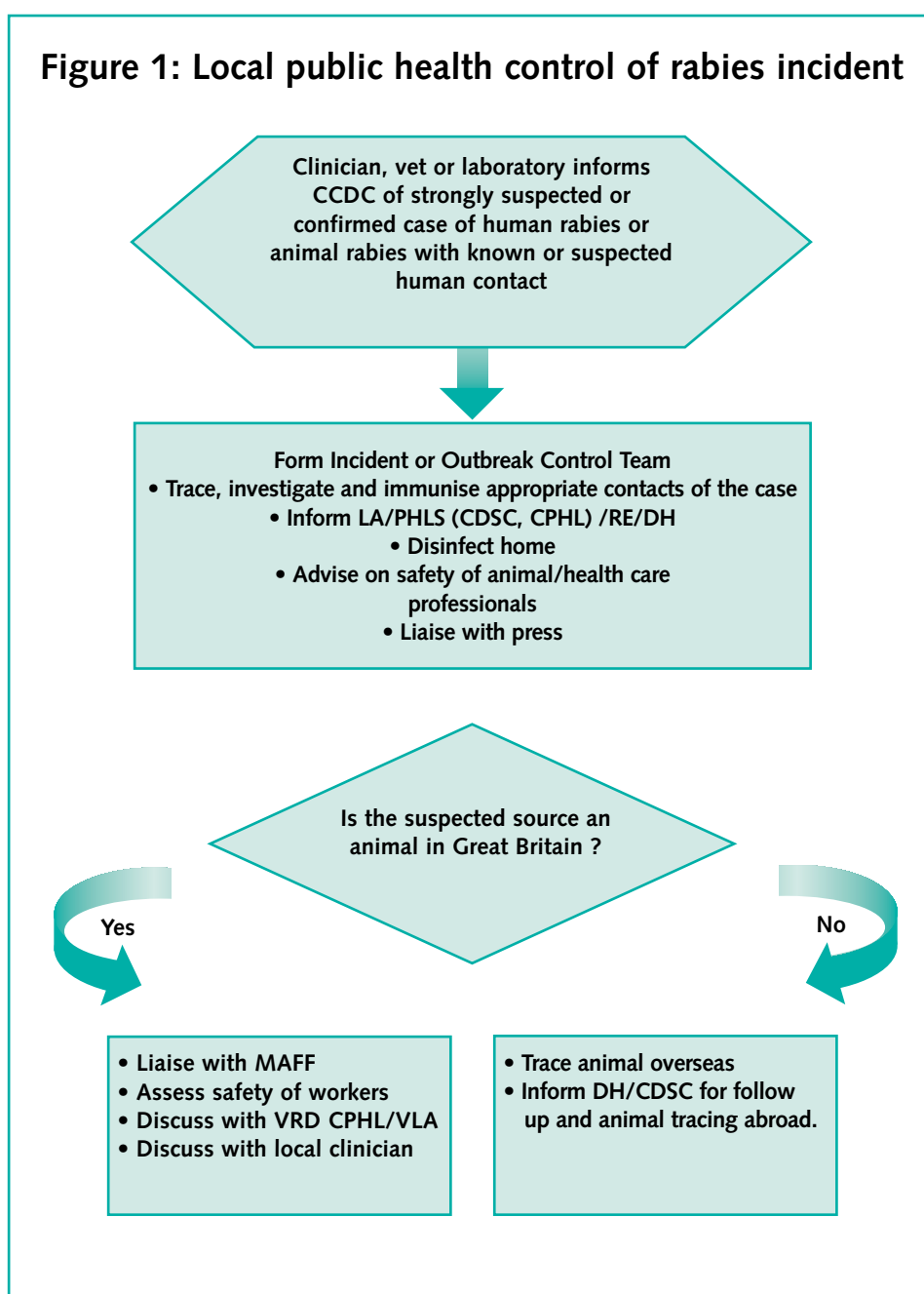
- 4.10 Where there is a reasonable suspicion of rabies, i.e. the presence of clinical symptoms, in an animal that has bitten or scratched a person, MAFF via the State Veterinary Service may arrange for the destruction of the animal and submission to the Veterinary Laboratories Agency at Weybridge for diagnostic examination of the brain.
- 4.11 Where there is no human exposure, the animal concerned is normally isolated for observation in secure accommodation. A dog or cat may be detained for up to 15 days following the onset of clinical symptoms during which time it is inspected regularly by a veterinary surgeon. If it survives this period in reasonable health, then rabies is eliminated as a diagnosis. If it dies, the head and neck are submitted for diagnostic examination of the brain (see paragraph 3.9).

Rabies on farms

- 4.12 Where a suspected or known rabid animal is found on a farm, attention will have to be given to the disposal of farm products from both suspect and contact animals. Primary responsibility rests with the State Veterinary Service. Disposal of milk from suspected or affected animals must be in accordance with the terms of the licence issued by the Ministry (MAFF) Inspector.
- 4.13 The CCDC may also be called upon, particularly where farm animals are involved, to advise the State Veterinary Service on the extent of human risk in allowing contact animals to remain in detention and isolation on farm premises. Persons who are likely to come into contact with such animals should be made aware of the potential hazards and should be offered pre-exposure prophylactic vaccination.

Flowchart

4.14 Figure 1 outlines the steps to be taken by the CCDC in the event of a suspected or confirmed case of animal or human rabies. [CCDC – Consultant in Communicable Disease Control, LA – local authority, PHLS – Public Health Laboratory Service, CDSC – Communicable Disease Surveillance Centre, CPHL – Central Public Health Laboratory, RE – Regional Epidemiologist, DH – Department of Health, MAFF – Ministry of Agriculture, Fisheries and Food, VRD – Virus Reference Division, VLA – Veterinary Laboratory Agency.]



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Appendix 1

Government policy, legislation & PETS

Government Policy

1. To counter the threat of rabies the Government has the following policy:
 - a) *The primary aim:* to keep rabies out of Great Britain by means of stringent import controls, with strict penalties for offenders. Controls involve compulsory quarantine for six months, unless an exemption is made under the 'Balai arrangements' or the Pet Travel Scheme.
 - b) *The contingency aim:* should an outbreak nevertheless occur, to prevent it becoming established in wildlife, by containing it and eradicating it, swiftly and effectively.
2. Until recently the Government policy required, as a general rule, all rabies susceptible mammals (excluding farm stock and some herbivores not considered significant vectors of the disease) entering Great Britain to have a licence and be subject to six months quarantine. Animals coming from Northern Ireland, the Republic of Ireland, the Channel Islands and the Isle of Man were exempt.
3. Since the Waterhouse review of rabies policy in 1970 there have been a number of scientific advances. These have included developments in: understanding of vaccination and the rabies virus; ability to blood test for immunity; microchip technology and the electronic identification of animals.
4. These advances prompted a reconsideration of the quarantine system. The independent Advisory Group on Quarantine, chaired by Professor Kennedy, concluded in its report (MAFF, 1998) that there would be no significant increase in the risk of importing rabies if the quarantining of certain animals from certain qualifying countries (including western Europe) was replaced by a system based on microchip identification, vaccination with blood testing, and certification. This conclusion was drawn on the assumption that there would be a high level of compliance with these safeguards.

5. The Pet Travel Scheme (PETS) begins on 28 February 2000, initially as a pilot. PETS allows exemption from quarantine for those animals that satisfy its conditions. Under the pilot scheme only pet cats and dogs from Western Europe and assistance dogs from Australasia are eligible, but in the future consideration will be given to extending the scheme to additional species and further qualifying countries. The pilot will allow the requirements of the Scheme to be tested and evaluated.
6. Commercially traded cats and dogs can be exempted from quarantine if they comply with the EC's 'Balai arrangements' (in Council Directive 92/65/EC), transposed into law in Great Britain in 1994.
7. Rabies susceptible mammals that do not qualify under either of the above two arrangements, or which fail to meet their conditions, are still subject to the licence and quarantine requirements.
8. Pet animals travelling within the British Islands and the Republic of Ireland will continue to be able to do so without restriction.

Legislation

9. The current rabies legislation is as follows:
 - Rabies Act 1974 - enabling powers and penalties for offences.
 - The Rabies (Importation of Dogs, Cats and Other Mammals) Order 1974, amended in 1977, 1984, 1986, 1994 and through the Channel Tunnel (International Arrangements) Order 1993 - import controls and quarantine requirements, Balai arrangements.
 - The Rabies (Control) Order 1974 - measures to be brought into operation should an outbreak occur.
 - The Rabies (Compensation) Order 1976 - compensation for animals compulsorily destroyed when dealing with an outbreak.
 - Animal Health Act 1981 - powers to make the above Orders.

10. Further legislation will provide for the pilot Pet Travel Scheme in England. This will come into force in early 2000. Corresponding legislation in Scotland and Wales will be made. Animals shall legally be able to be brought into England at Cheriton, through the Channel Tunnel. The Pet Travel Scheme (Pilot Arrangements) (England) Order 1999 provides for this.
11. In 2000/2001 further Orders will replace the Rabies (Importation of Dogs, Cats and Other Mammals) Order 1974 and the Pet Travel Scheme (Pilot Arrangements) (England) Order 1999. These will provide for the full Pet Travel Scheme, will require the quarantining of other imported animals, and set out standards for quarantine premises, including for welfare in quarantine.

Quarantine

12. The requirements for animals to be quarantined are principally laid out in the Rabies (Importation of Dogs, Cats and Other Mammals) Order 1974. All mammals are covered, except farm stock and some herbivores which are not considered significant vectors of the disease. These exceptions can be subject to controls if they have been in contact with species subject to quarantine regulations. However, they are themselves subject to other animal health import controls which provide safeguards against rabies.
13. The main provisions are as follows:
 - a) Bringing in an animal from outside Great Britain (including ones exported and brought back) is prohibited except in accordance with the terms of a licence issued in advance (except for those animals entering under the Pet Travel Scheme or the Balai arrangements - see below).
 - b) This prohibition does not apply to animals brought from Northern Ireland, the Republic of Ireland, the Channel Islands or the Isle of Man, unless the animal had been brought to those countries from elsewhere and had not undergone at least six months' quarantine, if it was required, before entering Great Britain.
 - c) Licensed landings are permitted only at authorised ports and airports, other than in exceptional circumstances. Licensed animals must be moved to quarantine premises by an authorised carrying agent.

- d) Animals imported under licence must be detained in quarantine for six months (life in the case of vampire bats), at the owner's expense. Quarantine may be extended in the case of a rabies outbreak at the quarantine premises.
 - e) Vaccination against rabies of dogs and cats in quarantine is compulsory, unless the animal has been imported for research purposes with which the vaccination might interfere.
 - f) There are equivalent provisions in respect of animals transshipping Great Britain, or animals on vessels which dock here.
 - g) Animals which contravene or fail to comply with these provisions may be seized.
14. Quarantine premises and their veterinary supervisors are subject to statutory standards and procedures relating to disease security. These are inspected by government veterinary officers to ensure that the requirements are met.

The Balai Arrangements

15. Under Council Directive 92/65/EC (the so-called 'Balai arrangements') implemented into law in Great Britain in 1994, commercially traded cats and dogs from the EU can enter Great Britain without quarantine where they meet certain requirements. These include that the animals:
- a) are the subject of a commercial transaction,
 - b) are individually identified with an implanted microchip,
 - c) have been vaccinated against rabies with an inactivated vaccine (of at least one international antigenic unit) when at least three months of age and at least six months before export,
 - d) have been blood tested after vaccination to show a satisfactory level of protection,
 - e) are accompanied by a veterinary health certificate, and vaccination record, and show no signs of contagious disease,

- f) have been born and remained on a registered holding of origin since birth with no contact with wild animals susceptible to rabies,
 - g) must be transported in a means of transport approved in the member state of origin.
16. Agriculture Departments must be notified of the details of animal movement at least 24 hours in advance.

The Pet Travel Scheme (PETS)

17. The Pet Travel Scheme enables certain pet animals to enter or re-enter Great Britain without quarantine, if they come from qualifying countries via designated routes, are carried by authorised transport companies, and meet the conditions of the scheme.
18. The pilot scheme commences on 28 February 2000 and is restricted to pet cats and dogs from western European countries (plus assistance dogs from Australasia). A pet must not have been to a non-qualifying country in the six months before entry to Great Britain. The person bringing in an animal will be asked to sign a declaration that the pet complies with this requirement. In the following order these animals must:
- a) be fitted with a microchip.
 - b) be vaccinated against rabies using an inactivated vaccine authorised for use in the qualifying country in which the animal is resident.
 - c) be blood tested, and the test performed at a laboratory recognised by MAFF. The blood test result must show that the vaccine has given a satisfactory level of protection against rabies. An animal will not be able to enter Great Britain until six months from the date that the blood sample, which gave a successful test result, was taken.
 - d) be accompanied by an official certificate certifying that the above requirements have been met. A government-authorised veterinarian of the country concerned must issue the certificate.

- e) be treated before embarkation for Great Britain to prevent the spread of certain tapeworms and ticks, carried by cats and dogs, that are vectors for diseases that pose a threat to public health in Great Britain. The administering vet will issue a certificate to certify that this has been done.
19. The transport company bringing a pet animal to Great Britain will be required to check the microchip number of the pet and that its corresponding certification is in order before it is allowed to enter. Before being authorised to carry pets to Great Britain, each company will have to enter into a binding agreement with MAFF. This will specify, among other things, the facilities and procedures to be followed in checking pets and the number and level of training of staff.
20. Under the Pet Travel Scheme any animal that does not qualify may be brought to the UK only under the 1974 Order (see above). Penalties on the pet owner for failure to comply are set out in paragraph 26. A transport company can incur penalties for failure to check animals to the standard required in their authorisation to carry pets to Great Britain. These include the revocation of the authorisation.

Responsibilities and Co-ordination

Allocation of responsibilities

21. The execution of the Government's policy requires the concerted and co-ordinated effort of several government departments and the regional executives as well as local authorities, port authorities and the police. The ultimate responsibility for rabies control lies with the Minister of Agriculture, Fisheries and Food. Interested government bodies include:
- The Ministry of Agriculture, Fisheries and Food (MAFF)
 - The Scottish Executive, particularly the Rural Affairs Department (SERAD)
 - The National Assembly for Wales, particularly the Agriculture Department (NAWAD)
 - HM Customs and Excise - enforcement of import controls at ports and airports.

- Department of Health (DH) - rabies in humans, prophylactic and post-exposure vaccinations
- Department of the Environment, Transport and the Regions (DETR) - nature conservation, local authority implications
- The Home Office - cruelty to domestic and captive animals, police implications, penalties.

British Isles Co-ordination

22. The Government also liaises with the devolved authorities in Scotland and Wales, and the appropriate authorities in Northern Ireland, the Republic of Ireland, Jersey, Guernsey, and the Isle of Man to ensure compatibility of legislation and regulations and to co-ordinate defences with the collective aim of keeping rabies out of the British Isles.

Enforcement

Enforcement Procedures

23. The local authorities are the principle enforcement authorities for animals illegally brought into Great Britain, usually through designated Animal Health Act inspectors. Officials from the agriculture departments enforce the rules governing quarantine premises, which are inspected at least four times a year. Annual inspections of carrier's vehicles are also undertaken.
24. Port and airport officials, such as customs, have a duty to be vigilant against illegal landings. Authorised ports of entry must also provide adequate approved secure holdings for temporary retention of animals as necessary. Shipping and airline companies are required to ensure that animals do not embark on a journey to Great Britain without a boarding document showing that a licence has been granted, or without satisfying themselves that the animal qualifies for entry under the Pet Travel Scheme or Balai arrangements.
25. Under the Pet Travel Scheme there will be spot checks on animals checked by authorised carriers for quality assurance. Audits of the carriers' procedures will also be performed.

Penalties and Prosecutions

26. Offences under the Rabies (Importation of Dogs, Cats and Other Mammals) Order 1974 can be dealt with under summary proceedings, where the maximum penalty is a fine of £5,000. Where there is evidence of deliberate intent to evade the provisions, indictment can result, in which case the maximum penalty is an unlimited fine and/or up to one year's imprisonment. In addition, the animal may be re-exported, licensed to quarantine, or destroyed at the discretion of the enforcing authority, though the latter is not intended to be a punitive measure.

Commercial Transport Companies

27. No transport company is permitted to accept animals for landing in Great Britain except under the Pet Travel Scheme or the Balai arrangements, or (if destined for quarantine) through authorised ports of entry and on production of a boarding pass, which shows that a licence has been issued. Carriers of animals imported under the Pet Travel Scheme must be specifically authorised to do so; this authorisation will specify the routes on which animals may travel.

Small Boats and Yachts

28. The owner or captain of a small boat or yacht is required to sign a customs declaration form on arrival, and is informed of their obligations concerning the proper confinement of animals onboard while in port in Great Britain. There is publicity emphasising the danger from illegally imported animals, and to remind boat-owners about the quarantine restrictions. **Animals landed from small boats and yachts are not eligible for the Pet Travel Scheme.**
29. Customs and harbour masters are involved in surveillance, as are the police and local authorities, as well as the public.

Oil Rigs

30. Rabies susceptible animals landing on oil rigs are subject to the normal six months' quarantine requirement, whether or not they have come from outside territorial waters or have had contact with 'foreign' animals. They are not eligible for the Pet Travel Scheme.

Information and Publicity

31. The Ministry of Agriculture, Fisheries and Food can be contacted for further information on quarantine procedures, including the Balai arrangements, and the Pet Travel Scheme:

Ministry of Agriculture, Fisheries and Food
Animal Health (Disease Control) Division, Branch A
1A Page Street,
London SW1P 4PQ
Tel: 020 7904 6000

32. In addition MAFF offers a telephone helpline service for enquiries about the Pet Travel Scheme, on **0870 241 1710**. There is also further information on MAFF's website, at **<http://www.maff.gov.uk/animalh/quarantine/>**

33. The Agriculture Departments for Scotland and Wales can also be contacted for advice:

Scottish Executive Rural Affairs Department (SERAD)
Animal Health and Welfare Branch Room 350,
Pentland House,
47 Robb's Loan,
Edinburgh EH14 1TY
Tel: 0131 244 6181

National Assembly for Wales
Agriculture Policy Division
Crown Buildings
Cathays Park
Cardiff CF1 3NQ
Tel: 029 20825 641

Appendix 2

Human diploid cell vaccine and its use for pre-exposure prophylaxis

1. Rabies human diploid cell vaccine (HDCV) is a freeze-dried suspension of Wistar rabies virus strain PM/WI 38 1503-3M cultured in human diploid cells and inactivated by beta-propiolactone. It should be stored at 2 - 8°C and not frozen.

Reconstitution of the vaccine

2. The vaccine is issued by the manufacturer in single-dose vials accompanied by a disposable syringe containing 1.0 ml of diluent (distilled water). The vaccine should be reconstituted immediately before use. The entire amount of diluent is used and the resultant 1.0 ml of fluid represents one dose (except where administered intradermally). The potency of the reconstituted vaccine is not less than 2.5 International Units per 1 ml dose. Any unused vaccine must be discarded after one hour.

Dosage schedule

3. The recommended schedule for primary pre-exposure immunisation with HDCV is three doses of 1.0 ml given by deep subcutaneous or intramuscular injection in the deltoid region on days 0, 7 and 28. (The antibody response may be reduced if the gluteal region is used).
4. For travellers who are not animal handlers, two doses of 1.0 ml by deep subcutaneous or intramuscular injection four weeks apart can be expected to give immunity in 98% of recipients, and may be acceptable if post-exposure treatment is likely to be readily available. For those at continued exposure, a further dose should be given 6 - 12 months later.

Reinforcing doses

5. Where post-exposure treatment is readily available, as in Great Britain, reinforcing doses are not required for individuals who have received three doses of vaccine unless exposure occurs (but see below).

Otherwise, single reinforcing doses of vaccine should be given at two to three year intervals to those at continued risk, the interval to be reviewed after 2 - 3 reinforcing doses.

6. The three dose primary pre-exposure course produces protective antibody in virtually 100% of recipients and makes routine post-immunisation serological testing unnecessary. Serological testing is advised for those who work with live virus. They should have antibodies tested every six months and be given reinforcing doses of vaccine as necessary to maintain protective levels. Serological testing is otherwise only advised for those who have had a severe reaction to a previous dose of vaccine to confirm the necessity for a reinforcing dose.

Supplies

7. HDCV for pre-exposure immunisation for those at occupational risk is supplied by the Department of Health and is available from the PHLS Virus Reference Division (Tel: 020 8200 4400). For others, it can be obtained through local pharmacies by private prescription. In Scotland details of availability of vaccine are held by SCIEH (0141 300 1100).

Appendix 3

Guide to post-exposure treatment

The recommendations given here cover most situations. It is recognised that in special situations modifications of the procedures laid down may be warranted. Such special situations include exposure of young children and other circumstances where a reliable history cannot be obtained, particularly in areas where rabies is known to be endemic, even though the animal is considered to be healthy at the time of exposure. In areas where rabies is endemic, adequate laboratory and field experience indicating that there is no infection in the species involved may justify local health authorities in recommending no specific anti-rabies treatment.

Treatment should be started as early as possible after exposure, but in no case should it be denied to exposed persons whatever time interval has elapsed.

Treatment of wounds involving possible exposure to rabies

First-aid treatment

Elimination of rabies virus from the site of infection is aided by immediate washing with soap or detergent, or if they are not available, water alone, under a running tap for at least 5 minutes. Then either 40-70% alcohol, tincture or aqueous solutions of iodine or quaternary ammonium compounds which have a proven lethal effect on rabies virus, e.g. Cetrimide solution 0.1% BPC, should be applied; and cover with a simple dressing.

Please note:

Primary suture and scrubbing should be avoided if possible. This will cause further damage to the wound and possibly increases the risk of introduction of the virus to the nerves.

Where soap has been used to clean wounds, all traces of it should be removed before application of quaternary ammonium compounds because soap neutralises the activity of such compounds.

Do not apply unfamiliar substances to wounds that could destroy the body's immune response.

Treatment by or under the direction of a physician

1. treat as above;
2. postpone suturing the wound;
3. where indicated, institute anti-tetanus procedures and administer antibiotics and drugs to control infections other than rabies.

Specific Treatment according to geographical location

Subsequent treatment will depend on the risk of rabies in the country concerned and the immune status of the individual, but each incident has to be judged on its merit. Points to consider include whether the animal is indigenous (native) or not, its behaviour, the site and severity of the bite and whether the bite was provoked.

Risk according to geographical location (at the time of publication):

1. **No Risk:** generally no rabies post-exposure prophylaxis needed.

The following countries are considered 'no risk' for terrestrial rabies (however for bat exposures, specialist advice should be sought):

Europe: Cyprus, Faroe Is, Finland, Gibraltar, Greece, Iceland, Ireland, Italy (except the Northern & Eastern borders) Malta, Norway (mainland), Portugal, Mainland Spain (exc. N.African Coast), Sweden and the United Kingdom.

Americas: Anguilla, Antigua & Barbuda, Bahamas, Barbados, Bermuda, Cayman Is, Dominica, Guadeloupe, Jamaica, Martinique, Montserrat, Netherlands Antilles, St Christopher & Nevis, St Lucia, St Martins, St Pierre & Miquelon, St Vincent & The Grenadines, Turks & Caicos Is, and the Virgin Is.

Asia: Japan, Singapore, Taiwan.

Oceania: American Samoa, Australia, Belau, Cook Is, Federated States of Micronesia, Fiji, French Polynesia, Guam, Kiribati, New Caledonia, New Zealand, Niue, Northern Mariana Is, Papua New Guinea, Samoa, Solomon Is, Tonga, Vanuatu and Western Samoa.

2. **Low Risk:** vaccine only required:

Previously unimmunised or incompletely immunised individuals should be given 5 doses of 1.0 ml HDCV on days 0, 3, 7, 14, and 30.

Previously fully immunised individuals (i.e. those who have had a three dose primary course of HDCV) should be given two doses of 1.0 ml HDCV, one on day 0 and one between days 3-7.

Vaccine must be given by deep subcutaneous or intramuscular injection into the deltoid region (not gluteal) or, in a child, the anterolateral aspect of the thigh.

The following countries are considered low risk:

Belgium, Canada, Denmark, France, Germany, Luxembourg, Netherlands, Switzerland, USA. (For bites within the USA, the Centre for Disease Control in Atlanta may be able to provide more information on the risk of rabies in different parts of the USA).

3. **High Risk**

Previously unimmunised individuals should be given immunoglobulin as well as vaccine as follows:-

- i) Immunoglobulin: human rabies-specific immunoglobulin 20iu/kg body weight, up to half the dose infiltrated in and around the wound after cleansing and the rest given by intramuscular injection. Human rabies immunoglobulin may cause local pain and low-grade fever but no serious adverse reactions have been reported.
- (ii) Vaccine: 5 doses of 1.0ml HDCV by deep subcutaneous or intramuscular injection into the deltoid muscle (not the buttocks) or, in children, anterolateral thigh, one each on days 0, 3, 7, 14, and 30.

Previously fully immunised individuals: Two doses of 1.0 ml HDCV given as above, the first on day 0 and the second between days 3-7. Immunoglobulin treatment is not usually needed.

Countries considered high risk are:

Colombia, Ecuador, El Salvador, Guatemala, India, Parts of Mexico, Nepal, Pakistan, Peru, Philippines, Sri Lanka, Thailand, Turkey, Vietnam. Also most other countries in Asia, Africa and South America.

Up to date advice should be obtained from the Virus Reference Division, Central Public Health Laboratory, Colindale, London, NW9 5HT, as the country by country risk groups may change (Tel: 020-8200 4400). In Scotland this information can be obtained from SCIEH, Clifton House, Clifton Place, Glasgow. G3 7LN. (Tel: 0141 300 1100).

Specific Treatment according to nature of exposure

Nature of exposure	Status of biting animal (irrespective of previous vaccination)		Recommended treatment
	At time of exposure	During 15 days ¹	
I. Contact, but no lesions; indirect contact; no contact.	Rabid	-	None.
II. Licks of the skin; scratches or abrasions; minor bites (covered areas of arms, trunk, and legs).	(a) Suspected as rabid	Healthy	Start vaccine. Stop treatment if animal remains healthy for 15 days ¹
		Rabid	Start vaccine; administer rabies immunoglobulin if appropriate upon positive diagnosis and complete the course of vaccine.
	(b) Rabid; wild animal, or animal unavailable for observation.		Vaccine + rabies immunoglobulin - according to country by country risk and previous immunisation history.
III. Licks of mucosa; major bites (multiple or on face, head, finger or neck).	Suspect ² or rabid domestic or wild animal, or animal unavailable for observation.		Vaccine + rabies immunoglobulin - according to country by country risk and immunisation status. Stop treatment if animal remains healthy for 15 days ¹ .

¹ Observation period in this chart applies to dogs and cats.

² All unprovoked bites in endemic areas should be considered suspect.

Appendix 4

Stockholders of rabies vaccine and immunoglobulin

Human diploid cell vaccine (HDCV) is available from Pasteur Merieux MSD Ltd. (Tel: 01628 773 200).

Human rabies immunoglobulin (HRIG) is manufactured by Bio Products Laboratory (BPL) and supplied through some Public Health Laboratories (see below), and the Scottish National Blood Transfusion Service.

HDCV for pre-exposure immunisation of those at occupational risk is available from the PHLS Virus Reference Division, Tel. 020 8200 4400. For others, it can be obtained through local pharmacies by private prescription. Information may be obtained from the PHLS Virus Reference Division or the Scottish Centre for Infection and Environmental Health (0141 300 1100).

For post-exposure use, vaccine is supplied by:

- 1. Virus Reference Division**
Central Public Health Laboratory, 61 Colindale Avenue, London NW9 5HT.
(Tel: 020 8200 4400, Fax: 020 8200 1569).
- 2. PHLS Group Laboratory East**
Public Health & Clinical Microbiology Laboratory, Box 236, Addensbrookes Hospital, Hills Road, Cambridge CB2 2QW.
(Tel: 01223 257 036, Fax: 01223 242 775)
- 3. PHLS Group Laboratory Midlands**
Public Health Laboratory, Birmingham Heartlands and Solihull NHS Trust, Birmingham Heartlands Hospital, Bordesley Green East, Birmingham B9 5SS. (Tel: 0121-766 6611, Fax: 0121-772 6229).
- 4. PHLS Group Laboratory North**
 - (a) Public Health Laboratory, Institute of Pathology, Newcastle General Hospital, Westgate Road, Newcastle upon Tyne NE4 6BE.
(Tel: 0191-273 8811, Fax: 0191-226 0265).

(b) Public Health Laboratory, Bridle Path, York Road. Leeds.
TS15 7TR.
(Tel: 0113 264 5011, Fax: 0113-260 3655).

5. PHLS Group Laboratory North West

Public Health Laboratory, Fazakerley Hospital, Lower Lane,
Liverpool L9 7AL.
(Tel: 0151-529 4900, Fax: 0151-530 1647).

6. PHLS Group Laboratory South West

(a) Public Health Laboratory, Church Lane, Heavitree, Exeter
EX2 5AD.
(Tel: 01392 402977, Fax: 01392 412835).

(b) Public Health Laboratory, Salisbury District Hospital,
Odstock Road, Salisbury, SP2 8BJ.
(Tel: 01722 336020, Fax: 01722 412636).

7. PHLS Group Laboratory Wales

Department of Medical Microbiology and Public Health Laboratory,
University Hospital of Wales, Heath Park, Cardiff, CF4 4XW.
(Tel: 029 2074 2047, Fax: 029 2074 4123).

8. Port Health Unit, Gatwick Airport*

London Gatwick, West Sussex. RH6 0NP.
(Tel: 01293 533229/502358, Fax: 01293 502 503)

9. Port Health Unit, Heathrow Airport*

Terminal 3 Arrivals, Heathrow Airport, Hounslow, Middlesex.
TW6 1NB.
(Tel: 020 8745 7419, Fax: 020 8745 6181)

* Vaccination is only available to arriving passengers or those in transit before they have gone through customs. To ensure that post-exposure vaccination is available, if possible, ring the port health units at airports in advance

10. Scotland

Information on supply of vaccine and immunoglobulin is held by
SCIEH (0141 300 1100)

Appendix 5

The carriage of dangerous goods

Infectious substances are defined as “dangerous for transport” under the Carriage of Dangerous Goods (Classification, Packaging and Labelling) and Use of Transportable Pressure Receptacles Regulations 1996.

The Regulations (which apply to road and rail carriage) require that before substances are transported, the consignor has to:

- (i) identify substance (classification).
- (ii) suitably package substance.
- (iii) properly label package.
- (iv) provide information to the vehicle operator/carrier.

Infectious substances are those known or reasonably expected to contain pathogens. Pathogens are defined as micro-organisms (including bacteria, viruses, rickettsia, parasites, fungi) or recombinant micro-organisms (mutant or hybrid) that are known or reasonably expected to cause infectious disease in animals or humans. Infectious substances include biological products, diagnostic specimens, genetically modified micro-organisms (GMMs) /genetically modified organisms (GMOs) and wastes.

Classification

WHO criteria are used to classify pathogens into four risk groups. The probability of the presence of pathogens in certain risk groups determines whether the goods (i) are dangerous for carriage (e.g. goods containing only pathogens in risk group 1 are not dangerous for carriage) and (ii) in some circumstances, allows a reduction in the packaging requirements.

Packaging

The packaging must comply with the standard consistent with the classification. For infectious substances this includes:

- (i) inner packaging made up of a watertight primary receptacle.
- (ii) watertight secondary packaging and enough absorbent material between the two to absorb the contents of the primary receptacle.
- (iii) outer packaging of adequate strength, mass and capacity.

There is some flexibility for diagnostic specimens where there is only a low probability of pathogens in risk groups 2 and 3¹ being present. This includes specimens being transported for either initial diagnosis or routine screening for other than the presence of pathogens. Such samples are exempt from the full packaging requirements as long as the volumes of individual samples are limited and they are packaged to a specific standard. If the volume or packaging do not meet these standards then you need ensure that all the relevant recommendations have been met.

Labelling

Packages must be labelled with the following:

- (i) the proper shipping name of the goods.
- (ii) the UN number.
- (iii) the specified main danger sign.

Information for the carrier

The consignor must provide the following information to the carrier:

- (i) What is being carried, i.e. name, UN number and classification.
- (ii) Where it came from (name & address).
- (iii) Where it is going (name & address).
- (iv) How much is being carried.

- (v) Extra information to determine the transport category of the items and actions necessary in the event of an emergency.

There are exemptions from the main vehicle related aspects of the regulations for smaller amounts of substances in risk groups 2 & 3¹, but no exemptions for any amounts of substances in risk group 4¹, which are also subject to additional controls under Control of Substances Hazardous to Health².

¹ Advisory Committee on Dangerous Pathogens *Categorisation of biological agents according to hazard and categories of containment* (1995) 4th Edition. HSE Books. (ISBN 0717610381)

² *Control of Substances Hazardous to Health Regulations* (1999). SI 1999/437 Stationery Office. (ISBN 0110820878)

Appendix 6

Clinical waste

Detailed guidance on the handling and safe disposal of clinical waste is given in the document 'Safe Disposal of Clinical Waste' issued by the Health Services Advisory Committee¹.

Clinical Waste is defined in the Controlled Waste Regulations 1992² as being:

1. Any waste which consists wholly or partly of:

- human or animal tissue;
- blood or other body fluids;
- excretions;
- drugs or other pharmaceutical products;
- swabs or dressings;
- syringes, needles or other sharp instruments;

which unless rendered safe may prove hazardous to any person coming into contact with it.

AND:

2. Any other waste arising from medical, nursing, dental, veterinary, pharmaceutical or similar practice, investigation, treatment, care teaching or research, or the collection of blood for transfusion, being waste which may cause infection to any person coming into contact with it.

¹ *Safe Disposal of Clinical Waste* HSAC 1999. HSE books. (ISBN 0717624927)

² *The Controlled Waste Regulations* 1992. SI 1992/588. HMSO. (ISBN 0110235886)

Clinical Waste is categorised according to its risk as follows:

Group A Includes identifiable human tissue, blood, animal carcasses and tissue from veterinary centres, hospitals or laboratories.

Soiled surgical dressings, swabs and other similar soiled waste

Other waste materials, for example from infectious disease cases, excluding any in Groups B-E.

Group B Discarded syringe needles, cartridges, broken glass and any other contaminated disposable sharp instruments or items.

Group C Microbiological cultures and potentially infected waste from pathology departments and other clinical or research laboratories.

Group D Drugs or other pharmaceutical products.

Group E Items used to dispose of urine, faeces and other bodily secretions or excretions which do not fall within Group A. This includes used disposable bed pans or bed pan liners, incontinence pads, stoma bags, and urine containers.

Clinical Waste from rabies-infected patients or animals is not subject to controls under the Special Waste Regulations 1996.

Identifiable human tissue is clinical waste unless it has been rendered safe and non infectious, but it remains an offensive waste and must be disposed of by incineration at all times.

Clinical waste disposal

Clinical waste containers must be capable of holding the waste without spillage and waste bags conforming to the appropriate NHS standard should be used.

All clinical waste should be disposed of by means of incineration.

If clinical waste is to be transported off site for disposal, the Carriage of Dangerous Goods (Classification, Packaging and Labelling) and Use of Transportable Pressure Receptacles Regulations 1996 (CDGCPL2) require the proper classification of clinical waste. The following are considered as **dangerous** for carriage:

- any infectious biological waste;
- any related swabs and dressings from hospitals, clinics, surgeries or laboratories;
- pharmaceuticals which are toxic or have flammable or hazardous properties;
- any infectious waste known or likely to be contaminated with pathogens in risk groups 2, 3, or 4, and
- sharps.

Clinical waste for transporting off site will need to be labelled with the correct UN number, UN2814 or UN2900 if animal waste.

Microbiological cultures and pathology waste will normally have been sterilised in accordance with HSAC guidance in which case it will not be dangerous for carriage.

Appendix 7

The management of a case of rabies in an animal

Contingency Plans

1. Detailed procedures have been developed to respond to an outbreak of rabies in Great Britain. The empowering legislation is currently the Rabies (Control) Order 1974 and also the Rabies (Compensation) Order 1976.
2. The majority of powers granted to the Minister of Agriculture are optional and can be put into effect if needed. The powers used would depend on the circumstances, including the nature and location of the outbreak. At one extreme there could be a situation where an infected domestic pet had had no contact with other animals, and limited measures might contain the disease. At the other extreme there could be an area containing infected wildlife, farm stock and domestic pets, where the problem of containment could be complex.

Notification of rabies

3. Rabies is a “notifiable disease” under Section 88 of the Animal Health Act 1981. Therefore anyone who knows or suspects that an animal may have rabies has a legal duty to report this to the police, a local authority inspector, or the local Divisional Veterinary Manager of the appropriate Agriculture Department. A veterinary enquiry will then ensue.

Veterinary investigation

4. As soon as there are reasonable grounds to suspect that an animal is infected with rabies, the premises on which it is kept will be declared an infected place. The suspect animals and any contacts will be secured within the premises or, in case of a high-risk suspect, removed for detention and observation to secure accommodation maintained by the Agriculture Departments for this purpose. If the circumstances point to the desirability of immediate slaughter and a rabies test, there is the power to do this. Alternatively the animal is

observed for up to 15 days. If it survives this period in reasonable health, then rabies is eliminated as a diagnosis. The brain of a dead suspect animal will be examined for evidence of rabies at the Ministry's Veterinary Laboratories Agency.

5. About 25 suspect rabies cases outside quarantine are investigated each year as part of normal animal disease control. Since 1970, none have proved positive. Dealing with suspects helps to keep all concerned alert and prepared. An effective procedure at this early stage lays the foundation for any necessary follow-up action, should the diagnosis prove positive.

Procedures following a confirmed case of rabies

6. The action will depend on the circumstances, the critical factor would be whether or not the infected animal had been at large with the opportunity of infecting other animals, including wildlife. If this were the case then an infected area would be declared, the size depending on the specific details of the case. This would enable any or all of the following measures to be put into effect:
 - a) restriction of movement of animals into and out of the area;
 - b) control and confinement of animals in the area (e.g. muzzling and leashing of dogs and leashing of cats);
 - c) seizure, detention and disposal of animals not under proper control in the area;
 - d) compulsory vaccination of animals;
 - e) prohibition of gatherings of animals and sporting and recreational activities, including hunting, the racing or coursing of hounds or dogs, point-to-point meetings and the shooting of game or other wildlife;
 - f) the eradication of the disease in wildlife.
7. In the event of a rabies outbreak in wildlife, control actions would be put into place to eradicate the outbreak and thus prevent rabies becoming endemic. These measures would focus primarily on foxes in the infected area, but may include other species such as feral cats and badgers. The methods employed, such as vaccination and/or culling, would be those deemed to be most effective to suit the local

circumstances while presenting the minimum hazard to other species of wildlife and to farm and domestic animals.

The National structure

8. The National Disease Control Centre (NDCC) for rabies is currently based in the Ministry of Agriculture, Fisheries and Food in London. It is responsible for maintaining national rabies awareness and preparedness, directing the local centres, and directing the national strategy in the event of an outbreak of disease e.g. determination of the infected area, deployment of staff and resources to the area, and the provision of information.
9. The 23 divisional offices of the State Veterinary Service throughout England, Scotland and Wales act as the Local Disease Control Centres. They are responsible for local rabies awareness and preparedness. In the event of an outbreak they arrange preliminary investigations (including diagnostic tests) in liaison with the NDCC, ensure that the infected area is placed under restriction with the help of the police and local authorities, are responsible for controlling the disease and eliminating it from the area, and arranging the payment of compensation in the event of the compulsory slaughter of animals.
10. Each local authority is also responsible for preparing its own rabies contingency plan. The plans clarify responsibilities and local resources and how these will be co-ordinated. In response to an outbreak measures might include co-ordinating the service of notices for confinement of pet animals, collecting stray animals and their care in detention or their destruction, public relations work, and maintaining records of animals, premises and areas involved in the outbreak.

Vaccination of Animals

Domestic Animals

11. Rabies vaccination is required for domestic cats and dogs that participate in the Pet Travel Scheme and for those that are exported to countries where regulations require it. Animals entering quarantine premises are vaccinated on arrival to provide an additional safeguard against the unlikely possibility of accidental cross-infection. So long as the country remains free of rabies the Government does not regard it necessary for animals resident in Great Britain to undergo routine vaccination.

12. In the event of an outbreak, compulsory vaccination of dogs and cats or other specified species may become necessary as a control measure in an infected area. Contingency plans exist for carrying out such a programme quickly and comprehensively.

Wildlife

13. In the event of a rabies outbreak in Great Britain that affects the wildlife population MAFF is considering the possibility of using vaccines as part of the control measures. The application of a ring of vaccine around an area in which an outbreak has occurred would immunise foxes which may migrate into the infected area from outside. Vaccination procedures will take some time to develop.



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This document is available on the Department's website at:
www.doh.gov.uk/memorandumonrabies/

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